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Population Theory: Academia's Stepchild

“Every year Malthus is proven wrong and is buried—only to spring to life again before the year is out. If he is so wrong, why can't we forget him? If he is right, how does he happen to be so fertile a subject for criticism?”

I wrote those words in the 1960s in an introduction to an anthology of essays on population.¹ How naive I was! I supposed that the voices that were then sounding the alarm about population growth would at last get the public's attention. And so they did for about a decade during which environmentalists made common cause with populationists. But some of the most influential of the environmental activists viewed population as a dangerous and unwanted diversion from what they conceived to be humanity's true problems.² Their stifling of public concern for population problems was reinforced during the Reagan years by self-styled “supply-side economists.” Soon the predominant population message broadcast by both the political left and the political right was “Not to worry!”

In 1968 ZPG, Inc., was founded to promote zero population growth as an ideal both for the United States and for the world. Its membership was confined mostly to 350 chapters on college campuses. Twenty-one years later, in 1989, the number had shrunk to just nine.³ Though Paul Ehrlich's *The Population Bomb* was a best-seller in 1968, worrying about population growth did not become a growth industry.

Malthusians saw population growth as a “root cause” of inflation, unemployment, pollution, congestion, unwanted immigration, influxes of heartrending refugees, trade wars, drug wars, and terrorism. Each of these pathologies has many causes; anti-Malthusians belittled population. Common economic experience made it hard to believe that a population gain of 2 to 4 percent per year (which characterizes poor countries) could be serious; the less than one percent annual growth rate found in rich countries seemed even more trifling. Students of population, however, pointed out that the *average* gain in world population during the past million years has been less than 0.002 percent per year. That “small” rate of increase, operating over a million years, has produced our present five billion people, not a “small” number by any standard. When it comes to rates of increase that are continued indefinitely, no rate that exceeds zero by the most minute amount can be regarded as small.

The first edition of Malthus's essay has very few numbers in it. Subsequent editions, more defensive in tone, include ever more numerical data. But, using num-

bers or not, Malthus struck many people as a heartless man. Karl Marx identified him as the “principal enemy of the people,” while Pierre-Joseph Proudhon called him “a political assassin,” and Pierre Leroux asserted that “Malthusians propose an annual massacre of the innocent.”⁴ The vilification continues to this day.

Such an *argumentum ad hominem* carries little logical weight, but “a decent respect to the opinions of mankind”—and womankind—requires that all the evidence bearing on Malthus’s character be presented. History records Malthus’s vigorous opposition to a “Poor Law” that had reduced free workers to pauperdom. Moreover, as William Petersen tells us,

[H]e is less well known as the advocate of free universal education, free medical aid to the poor, state assistance to emigrants, and even direct relief to families of more than six children, or as the opponent of using minors in cottage industry, and of free trade when it benefited the traders but not the public. The advocacy of free education for all was especially significant and, for his day, most unusual. Malthus did not see the gap between the social classes as innate; it could be bridged by the development of a sense of responsibility among the common people. And the upper classes were not automatically right by reason of their social position; if they did not fulfill their duty toward the lower classes and assist them in becoming self-reliant, they were thereby censurable.⁵

Malthus evidently found the accusation of hard-heartedness painful to bear. In 1806, eight years after his first publication, he complained that his critics

proceed upon the very strange supposition that the *ultimate* object of my work is to check population, as if anything could be more desirable than the most rapid increase of population, *unaccompanied* by vice and misery. But of course my ultimate object is to diminish vice and misery, and any checks to population which may have been suggested, are solely as means to accomplish this end.⁶

“It is,” Malthus said, “an utter misconception of my argument to infer that I am an enemy to population. I am only an enemy to vice and misery, and consequently to that *unfavorable proportion* between population and food which produces these evils.”⁷ And more explicitly: “In the desirableness of a great and efficient population, I do not differ from the warmest advocates of increase.”⁸

Thus unjustly, “Malthusian” now often stands for attitudes that were objectionable to Malthus himself. It has been said that one of the minor tragedies of life is that an author never escapes his first edition. It was all too easy for readers with conflicting biases to misread Malthus’s first edition. His claim that he was not an anti-people person was made in the appendix to the third edition. But what critic of a first edition bothers to read the third? And who reads appendixes?

Malthus Refuted?

Reading his *Essay on Population* one can justifiably infer that Malthus thought that England was already fully stocked with people; any further increase in population would bring about a corresponding decrease in prosperity. What, in fact, did happen in England after 1798, the year the *Essay* was first published?

In 1817, in the fifth edition, Malthus admitted that the census of 1811 “showed

a greatly accelerated rate of progress, and a greatly improved healthiness of the people." So: as the English population increased after 1798, misery actually decreased. This was not at all what Malthus had expected. Yet the author clung to his theory to the end of his life (in 1834), though empirical facts continued to go against him. Malthus was indeed a stubborn man.

Improvements in living conditions were not confined to England. The most convincing evidence of progress is found in the diet of European peoples before and after the publication of Malthus's essay. A diet that includes some meat is nutritionally better and more expensive than a wholly vegetarian diet. Before 1800 Europeans consumed only half a pound of meat per person per year, their diet being almost wholly coarse bread and potatoes. By 1850 the meat portion had risen to 100 pounds per capita per year.⁹ During the nineteenth century the average life expectancy rose from twenty-eight to fifty years, principally as a result of a dramatic fall in infant mortality, while the average height of adult Europeans increased by six inches. Understandably, the vigor and productivity of the workers also increased greatly, and with these personal gains came increases in the gross national product of the nations in which diets had improved. Better food produced a larger population of stronger people who earned larger incomes, which financed a still better diet, which . . . and so on and on. Truly, a "virtuous circle" had been set in place.

Population changes in several regions are shown in Box 4-1. During the 180 years that ended in 1980 the population of England, Scotland, and Wales increased almost six times; of the world, five times; and of the United States, forty-five times. Accompanying this explosive growth was a great increase in material well-being, the greatest occurring in the United States, where population growth was also greatest. A most un-Malthusian result! From facts like these some critics derived the counter-Malthusian conclusion: the more children, the better—forever. For more than a hundred years Malthusians have been fighting a rear guard action against such optimism.

Population Growth, Destroyer of Dreams

Are we then to conclude that "bigger is better" in all respects, at every level of population? Before we sign on with the chamber of commerce, we should look around for contrary effects of population growth. We need a simple example to epitomize what happens when population increases.

Look up into the sky! What do we *not* see? We do *not* see a heaven swarming

Box 4-1. Population Growth Since Malthus's Essay.

Region	Population numbers in millions (rounded)		Approximate factor of increase
	1800	1980	
United Kingdom	10	56	6
The world	906	4,414	5
United States	5	227	45

with airplanes. What is the significance of this? And what does it have to do with the size of the population?

Recently a flying enthusiast plaintively asked, in a letter to a popular magazine, what was happening to recreational flying in the United States.¹⁰ From 1980 to 1985, while the population was increasing by 5 percent, the number of nonmilitary pilot licenses declined by 14 percent. "What," the writer asks, "has happened to the dream of Icarus, of Leonardo . . . ?"

Long before writing was invented men must have dreamed of flying through the air like a bird. The Greek myth of Icarus grew out of this primordial longing. While Columbus was busy discovering a new world to the west, Leonardo da Vinci was trying to devise a way to fly over the old one. When men finally succeeded in producing planes that could stay aloft, intoxicated futurists painted pictures of a world pulsating with aircraft. In the 1920s and 1930s the covers of *Popular Science* and *Popular Mechanics* again and again depicted such a scene. The air pululated with gaggles of "personal airplanes." The two-car garage of Everyman's home was to be augmented by the two-plane hangar.¹¹

The brave new world of aviation was not to be. The personal plane that was to have become the aerial equivalent of the personal jalopy never materialized. The sale of single-engine planes declined from an annual high of 17,811 in 1978 to about 1,000 in 1987—down a whacking 94 percent.¹² There is no reason to think that their sales will ever recover. The bubble has popped: the future is past.

Why? True to a tradition of his tribe, our letter writer knew the answer: it was all the fault of lawyers and the government. With its multitudinous regulations Washington took the fun out of flying, while legal actions brought by lawyers, together with the cost of liability insurance, made flying prohibitively expensive. The engineers did their duty by the future: it was bureaucrats and lawyers who were to blame for the collapse of the dream.

There's some merit in this complaint, but it does not do justice to a fundamental factor that rules out the possibility of unlimited numbers of personal flying machines: overpopulation. It's easy for one person—me—to imagine myself as Leonardo flying through the air, because this intoxicating vision has only me in it. The dream is in the singular. But the science fiction of the magazine covers is a very plural dream: thousands—no, millions—of ordinary people were supposed to fly at the same time. (Nothing less would do, for there must be no nasty elitism in the world of tomorrow!)

Limitations of space have forced us to give up the dream of personal airplanes. Not space in the abstract, but practical space. Sure, if I want to fly from Santa Barbara to Fresno, the cylinder of space extending from these two cities out to the Pleiades seems, by human standards, to be infinite. But the most important space is take-off and landing space, which has reference to a point, not a volume. The practical space in which personal airplanes must take off, fly, and land is dangerously limited.

If population growth is not contained, and if a constant fraction of the population insists on flying airplanes, then sooner or later collisions between aircraft must become so common that the dream of an unlimited number of personal airplanes has to be abandoned. In truth, we reached that point some time ago. "Bigger is better"? Not if the demand variable (created by population) has the potential of

growing bigger without limit, while the supply variable (space), is severely constrained.¹³ If I want to fly to Fresno I don't want to have to land at an airport in Sacramento and then take slow surface transportation back to Fresno.

Technological optimists don't give up easily. They dream of sophisticated electronic equipment that would make it possible to place untold thousands of planes in the corridors between two cities. This dream presumes that each plane would be subject to rigid central control over its path and speed. Without trying to assess the probability of success in producing a computerized air traffic control system that would work flawlessly—for accidents would be unacceptable—we should ask what such an achievement would do for the dreams of Leonardo? What the true Leonardo dreams of is flitting about as effortlessly as a swallow, uncontrolled by directives emanating from a central political authority. This dream bubble has been popped by an *argumentum ad paradoxum*: the overpopulation that produces the need for flight to escape freeway congestion also produces the aerial congestion that negates the blessings of innovative technology.

With this example before us we cannot but wonder: as our population continues to grow, what other amenities that we enjoy today (or dream about for tomorrow) will we have to give up before tomorrow comes?

To be fair we must admit that there is another side to the coin. A larger population sometimes opens up desirable new opportunities. A country as small as Monaco cannot manufacture an automobile at a reasonable price; and only a very large nation can afford the extensive infrastructure required to send human beings to the moon. Where is the balance of good and bad resulting from population growth? Can we correctly estimate, in advance, the net gain or loss flowing from an innovation? And can we control the growth of population? At what cost?

“Truth” in Information-Mutable Sciences

The list of subjects recognized as science runs from anthropology through astronomy, botany, chemistry, economics, psychology, and sociology to zoology. That's a wide gamut, and it is generally recognized that the assemblage can be sorted into at least two groups. But what should the groups be called? Traditionally some of the sciences (notably physics) have been called “exact”; but what does that leave for the rest? “Inexact sciences”? Seldom is anyone so rude as to use that term in public. But what is the difference between physics, say, and sociology?

In recent decades academic disciplines have been divided into “natural sciences” and “behavioral sciences.” There is a curious lack of parallelism in these terms. The second group includes sociology, but no one is willing to call this an “unnatural science.” The adjective “behavioral” refers only to human behavior, which enters into sociology in a way that it does not in physics or chemistry. Some examples can clarify the distinction.

After making arduous measurements and calculations an astronomer predicts that there will be a total eclipse of the sun on 24 August 2007, giving the exact path it will follow on the globe. Whether his prediction is correct or not, the publication of it will have absolutely no effect on the path of the eclipse on 24 August 2007. Astronomy is an *information-stable science*.

For contrast, consider Alfred Kinsey's pioneering studies of human sexual

behavior in the United States. Although we do not know for sure, the extensive publicity given these studies in 1948 probably influenced American sex behavior in the years thereafter. A sociological study like Kinsey's can be said to be part of an *information-mutable science*. Although the figures turned up in sociology are not as exact as those of astronomy, this difference is probably less important than the effect that published figures have on future measurements themselves.

Many natural scientists have difficulty in understanding the distinction just made, though John Q. Public grasps it easily. Information mutability suggests that certain special instances of freedom of speech and freedom of inquiry need to be re-examined. (Maybe not changed, but at least examined.) In Canada the province of British Columbia used to have a law that stated: "No person, corporation, or organization shall, after the issue of the writ for an election, take any straw vote which will, prior to the election, distinguish the political opinions of the voters in any electoral district."¹⁴ The rationale for this injunction is found in the well-known sociological phenomena of "underdog effect" and "bandwagon effect." Which effect (if either) will be called forth by publicity given to pre-voting polls is indeterminate, but many lovers of democracy feel there is something unfair about the effects that polling has on voting. Such apparently was the belief of the electorate in British Columbia in 1960, when the restriction on freedom to poll was passed. (But in 1982 the legislature repealed the law.)¹⁵

Though America has never had such a law, government bureaus act with considerable restraint. The Bureau of the Census *might* include in its decennial census questions about the sex habits of householders, but it doesn't. Even the information it does gather often creates a storm when it is published. If a comparison of two successive censuses of River City reveals that its population is in a declining phase, the River City Chamber of Commerce may blow its top when the data get out. The chamber correctly assumes that knowledge of a decline may dissuade new industries from settling in River City.

Tempests over publicity versus suppression cannot be entirely avoided if the Bureau is to do its work, but some potentially troublesome reports can be nipped in the bud. In both 1980 and 1990 the Bureau refused to determine whether the aliens it counted were illegal or legal residents, though it was under considerable pressure to make this determination. (It was subjected to even more effective counterpressure by political organizations that did not want the truth to be known.) Because demography is an information-mutable science, no fact should be assumed a priori to be neutral. This means that some of the most significant investigations in demography must be carried out by organizations beyond the reach of the government—the NGOs they are called, the nongovernmental organizations.

A Specialty with No Licensed Experts

Some of our most enduring problems are ones for which there are no licensed experts. If this seems a shocking statement, note that two of the greatest unsolved problems of our time are the threat of atomic annihilation and the threat of overpopulation. For neither problem is there a cadre of experts who are legally or morally licensed to give authoritative answers.

Consider the first question: "Can we survive an all-out thermonuclear war?"

Those who know most about the physical potentials of nuclear explosives are not united in their answers. Physicists of great competence hold opposing views. The late Albert Einstein assured us that civilization cannot survive a thermonuclear war. Just as confidently the physicist Edward Teller says that such a war is survivable, and he has devoted the latter part of his life to a search for technology that will permit a nation (ours, of course) to wage and win an atomic war. Which expert are we to believe? And are all the experts addressing the same problem?

Perhaps we should take a poll of all highly trained physicists? It is probable that the results would show that the majority of them agree with Einstein; but, even if this were so, would that settle the issue? The majority is not necessarily right. After all, there was a time when most experts thought the world was flat. Moreover, as Marshall McLuhan said, "An expert is a man who doesn't make the slightest error on the road to the Grand Illusion."

When there is unremitting disagreement among experts, it is difficult to know what sort of expertise is relevant. Differences between physicists on the nuclear war question derive less from differences as to the facts of physics than from uncertainties about human reactions. How will people react to overwhelming threats and crushing disasters? Can we control the human propensity to make mistakes in the construction and operation of complex control systems? Can we lay out an exhaustive strategy for responding effectively to enemy threats? Mathematics, logic, psychology, and the principles of political science—these disciplines, and more, must be called upon to deal with "the threat of the atom." A knowledge of pure physics is not enough. Physicists *as such* cannot completely evaluate the threat of thermonuclear war. Human beings are involved in both the deploying and the taming of the atom. This means that the core problems lie in the behavioral sciences—which, as we have just seen, are not "exact" or information-stable sciences, but information-mutable sciences. When there are no recognized experts, the distinction between authorities and laymen loses much of its meaning. We then have to rely on common sense and intuition as we evaluate the evaluators.

Turning to population we wonder whom we should consult about the future. We think first of demographers because, etymologically, demography consists of the "writings about people" (Gr. *demos*, "people"). In practice, demography is mostly restricted to the counting of people. But given points on a graph corresponding to past counts of people it is only human to hope that the curve connecting past points might successfully predict the future.

Unfortunately experiences in predicting the future have not been very happy. Reviewing a small sample of past failures is a salutary exercise. Paul Demyen has pointed out that "in 1945, Frank Notestein, then the most eminent figure among American demographers, foresaw a year 2000 population of some 3 billion."¹⁶ The population of the world is now expected to be twice that when the new century rolls around. In 1933 statisticians on President Hoover's Research Committee on Social Trends thought that the population of the United States would probably stabilize below 150 million. It is now 255 million, fully 69 percent greater, and still growing. Thirteen years later the U.S. Bureau of the Census was willing to raise the 1990 population prediction only to 165 million, a number that was surpassed by the year 1960. Many such instances led Joseph S. Davis to conclude that "the very term 'population trend' is deceptive and dangerous."¹⁷

That was said in 1952, and in a few more years the majority of the demographers found themselves fighting a battle against the journalists. The demographers pointed out that all their future-referenced figures were merely the result of continuing a curve that connected the population figures of the past on into the future; but the future is obviously not an item of *knowledge* until it arrives. What we give you, said the demographers, are projections (of past curves), not predictions.

The warning had little effect, of course: the projections of demographers were happily converted to predictions in the press, no matter how carefully demographers hedged their statements. One very successful journalist recently even eliminated the middle man and became his own ebullient demographer, confidently predicting populations a hundred years ahead. He backs up his predictions with impressive statistics, which Michael Teitelbaum bluntly called "GIGO trash"—"Garbage In, Garbage Out."¹⁸

It is wise and proper that trained demographers should hesitate to make any projections for fear they will be taken as predictions, but it is also understandable that the eminent demographer, Nathan Keyfitz of Harvard, should view the result with some misgiving. Demography has, he says, "withdrawn even from its borders and left a no-man's land which other disciplines have infiltrated."¹⁹ Some of the solidest parts of demography act principally as a handmaiden to business, telling clients the age and economic circumstances of potential customers, both now and in the near future (that is, in the next five years). We need demographers just as we need accountants: both deal with records of the past, which, in the hands of a few gifted analysts, may be used to expose possible futures.

The inadequacies of projections are easily seen when we look at prophecies made in the 1930s, the years of a worldwide economic depression. It was almost universally agreed that population growth was coming to an end, both here and in the world at large. Only the final figures were controversial. Quite a few prophets were predicting the possibility of a world war ahead (from which they might have predicted a postwar pronatal psychology). But who could foresee the consequences of the antibiotics to come? (The sulfa drugs gave only the merest hint of the potency of penicillin and the like.) The fantastic power of DDT to kill mosquitoes and thus, for a time, diminish malaria, one of the great diseases of the world, was also yet to be appreciated.

There is no way that mere statistical projection can predict particular technological changes like these. Our best efforts should be bent toward understanding the fundamental elements involved in setting the limits of the world, guarding as best we can against errors bred by too little imagination.

Why Take a Census?

The ancients tended passively to accept the world as it is. We moderns love to define the unsatisfactory aspects of life as "problems" that we intend to "conquer." Thus it comes about that we speak of the "population problem" whenever we are distressed to find that life is not as pleasant as we would like it to be. In tackling the population problem, how important is it to have precise numbers? Do Americans, for instance, need to know the precise number of people living in the United States?

The American government being a *representative* democracy, our forefathers quite naturally assumed that it was essential that the number of citizens represented by each congressman be counted. "The actual enumeration," says Article I, Section 2 of the U.S. Constitution, "shall be made . . . every . . . ten years, in such manner as [the Congress] shall by law direct."

That was written in 1787, long before the development of scientific sampling methods, so of course the Congress specified that a census be taken. (Censuses are mentioned in the Bible.) At first blush one might suppose that the "total count" produced by a census would be more reliable than the result of sampling, but this is not necessarily the case. The greater the freedom of movement in society the harder it is to get all the citizens to stand still to be counted. The probable error of the U.S. census is not known with any exactitude, but professionals think the undercount of the first census (1790) may have been 2.5 percent of the population reported. It is believed that the undercount of the 1980 census was 1.4 percent. If so, that means that the reported figure (226,545,805) was too low by more than three million people. (3,171,641 people, if you insist on quoting your pocket calculator).

The error in world population figures is unknown, but it is bound to be much greater. If it is as much as 5 percent (which is not unlikely), the world population for mid-1989, reported by the United Nations as 5.321 billion, may have been as little as 5.055 billion or as much as 5.587 billion. (That would make the uncertainty plus or minus 266 million—more than the population of the United States at the time.) Newspapers made a great to-do about reaching the 5-billion mark on a certain date, but we don't know within many months the exact time when world population surpassed five billion. But—does it matter?

As far as the United States is concerned, having gotten in the habit of taking a decennial census we may never stop, though a great deal of money could be saved if sampling were substituted for the census. The cost of the 1990 census was over \$2 billion, or slightly more than \$8 per person. A scientific sampling method could yield equally reliable results at a cost of perhaps \$50 million. We should note that the Netherlands stopped taking censuses after 1971. The Dutch government believes it can get a good enough handle on the numbers by keeping track of births, deaths, immigration, and emigration. The population of the Netherlands is probably known more accurately without a census than is the population of the United States with one.

Hedgehogs and Foxes in Population Studies

In 1953 the philosopher Isaiah Berlin caught the attention of the learned community with a characterization of two contrasting types of intellects. His small book, *The Hedgehog and the Fox*, begins thus: "There is a line among the fragments of the Greek poet Archilochus which says: 'The fox knows many things, but the hedgehog knows one big thing.'"²⁰ After pointing out that "scholars have differed about the correct interpretation of these dark words," Berlin uses the images to distinguish between professional historians and men of letters.

No single interpretation of Archilochus's "dark words" should be taken as gospel.

I choose to employ the fable to distinguish between empiricists and theoreticians in the unending pursuit of knowledge—between investigators who glory in pursuing many little things while exhibiting a minimal interest in theory, and those who seek the “big things” that explain a wealth of little things.

It is now widely believed (and, I think, correctly believed) that the survival of a nation under modern competitive conditions depends on broadening the electorate’s competency in numerate matters. Numeracy is a virtue; but like all virtues the praise of it can be carried too far. The study of populations naturally generates a mountain of statistics that may be fun to fiddle with. Playing fox with statistics may be more comforting than being a hedgehog looking for the few big generalizations that make sense of the all-too-numerous little facts of demography.

Differences between “exact” and “inexact” sciences are not always obvious in publications. Any good public library makes possible a comparison between the *Handbook of Chemistry and Physics* and the United Nations’ *Demographic Yearbook*. Both are filled with tens of thousands of figures; but the accuracy of the two is utterly different.

A single example will show the extreme which accuracy sometimes reaches in the exact sciences. Physical theory tells us that “Dirac’s number” is 1.00115965246, with an uncertainty of only 1 part in 50 billion. To visualize the uncertainty, imagine the distance between Los Angeles and New York (2,451 miles) being measured by placing hairs side by side for the whole extent. (The thickness of an average human hair is only 80 microns, or roughly one three-hundredths of an inch.) The distance between the two cities is 50 billion hair-widths. Were Dirac’s number to be set equal to this distance, the uncertainty of the number would be only one hair-width!²¹ This figure has been checked by many independent investigators.

The contrast offered by the *Demographic Yearbook* could hardly be greater. Most of the recorded figures have not been checked by independent investigators. The stated population of a nation is whatever figure is sent to the United Nations by the officials of that country. There is often a strong suspicion that the ruling power of a nation wants, for political reasons, to exaggerate (or to minimize) the size of the population. The United Nations is not licensed to meddle with the figures sent it through official channels. As for the aggregate population of the entire world, do national exaggerations and minimizations substantially cancel each other out? No one knows. The end result is that there is, at all times, a considerable but unknown uncertainty in the published figures; and there is no assurance that the relative error stays the same from one yearbook to the next.

In demography, trends are of the greatest interest; but trustworthy trends presuppose reliable figures. Furthermore, a trend in human affairs is not like a vector in physics: it can change unexpectedly. In part this is because demography is an information-mutable science. When truth is mutable, accuracy to one part in 50 billion—or even one part in 1,000—would be pointless. Archilocus’s hedgehogs are more needed than foxes.

Many important human measures are difficult to define. “Literacy” is an example. If a person can write his name, should he be counted as one of the literate? Will literacy determinations in one country be comparable in accuracy to those in another? In the end we must agree with René Dubos: “Trend is not destiny.” Predictions in the behavioral sciences are inherently risky. Yet international coopera-

tion depends on the nations reaching some sort of agreement in their predictions of the future course of population growth and the resource needs created by population growth.

From Bucharest to Mexico City

Whenever nations get together in an attempt to solve their mutual problems it is certain that the product of their meetings will be rich in words and poor in numerical accuracy and ecological wisdom. This has been repeatedly illustrated in the history of the League of Nations (founded in 1919) and the United Nations (founded in 1945). Nearly a century's record has produced little to be optimistic about; but it has produced a little.

Lately, for instance, progress has been made in putting together a "Law of the Sea" to govern international fishing activities. As it becomes increasingly more difficult to deny the consequences of overfishing, further progress will no doubt be made. In this, as in all matters that require agreement among sovereign powers, the greater the suffering that follows from failure to agree, the faster will be the progress in reaching and enforcing agreements. *No progress without pain*. Probably most people regard this as a pessimistic conclusion, but it can easily be reworded into an optimistic mode: *Severe pain generates its own corrective, progress*. (It's astonishing what one can do with words!)

Does population growth necessarily create suffering and pain? Opinions differ: power and status create biases in reporting. Hunger, disease, deforestation, and loss of soil are the most disturbing consequences of overpopulation. At any given moment millions of human beings are suffering from these conditions. No precise figure can be given for how many, because the answer depends on definitions, and on data coming from remote areas that are difficult and unpleasant to survey. Poverty is a matter of definition. By World Health Organization standards it is likely that, at any given moment, as many as a thousand million human beings are suffering from malnutrition if not starvation. Almost always, the people who suffer the most are the least observed by reporters. Well-fed, healthy reporters seldom seek assignment to distant and miserable areas of malnutrition and starvation.

Moreover, well-fed government officials have a vested interest in bending the truth to minimize the possibility of a revolution in the system that supports them. They understand very well that the published results of surveys can affect how miserable people feel. Officials may flatly deny the existence of distress in those parts of the world for which they are responsible. Alternatively, they may admit the suffering but deny the role of population in causing it, pouncing on other factors as scapegoats.

Such scapegoating took place at the first United Nations conference on population in Bucharest in 1974. The head of China's delegation used both denial and scapegoating to steer the conference away from thoughts of population control. "Population is not a problem under socialism," he said, and then went on to serve up some tempting scapegoats. "The primary way of solving the population problem," he said, "lies in combating the aggression and plunder of the imperialists, colonialists and neo-colonialists, and particularly the superpowers."²² His analysis

was warmly welcomed by other delegates from the Third World. In the richer world it was also welcomed by the Vatican and the intellectual descendants of William Godwin.

The leader of the Indian delegation contributed the most memorable phrase of the conference: "Development is the best contraceptive." Operationally this translates into: "Instead of demanding that we poor countries control our populations, you rich countries should give us money for erecting factories, building dams, and eliminating poverty." In retrospect it looks as though the Indian delegation was just grandstanding at Bucharest, because two years later the central government of India issued the following statement for internal consumption:

If the future of the nation is to be secured . . . the population problem will have to be treated as a top national priority. . . . It is clear that simply to wait for education and economic development to bring about a drop in fertility is not a practical solution. The very increase in population makes economic development slow and more difficult of achievement. The time factor is so pressing, and the population growth so formidable, that we have to get out of the vicious circle through direct assault upon this problem as a national commitment. . . . Where [an Indian] state legislature, in the exercise of its own powers, decides that the time is ripe and it is necessary to pass legislation for compulsory sterilization, it may do so.

Individual Indian states did not grasp the power offered them, but voluntary sterilization continued to be encouraged. In the last six months of 1976 over six million people were sterilized in India. The number is impressive, until one looks behind it. Five years earlier, at a sterilization fair in the state of Gujarat (the birthplace of Mahatma Gandhi), nearly a quarter of a million men were vasectomized in one month's time; but—a questionnaire revealed that they had already had an average of 4.3 living children before they consented to the operation. Such a fertility rate doubles the population in less than a generation. In a culture like India's the population effect of voluntary sterilization, commendable though it be, is less than spectacular.

It is fair to say that in 1974 China, the most populous country in the world, made a shambles of the international population conference. Just ten years later the United States, the richest country in the world, took over China's destructive role at the second U.N. conference on population in Mexico City, repeating India's slogan, "Development is the best contraceptive."

There's an old saying that "politics makes strange bedfellows." So also do unconsciously shared ideologies. At first glance, the ideologies of China and the United States seemed (in 1984) to be very different: Marxism in China, capitalism in the United States. However, the common and unconsciously shared ideology of the two was (and is) a deep faith in technological progress. Holders of the reins of power in both nations believe that technology can solve all problems.

Yet faith in technology is highly selective. Technology that attacks the demand end of the demand-and-supply equation is not generally approved of. Communists denigrated contraception in 1974, capitalists rejected abortion in 1984. Both rejections stemmed in part from a childlike belief that technology can increase supply without limit. If there is no limit to supply, why risk squelching demand, that great engine of material growth? Those who worship at the shrine of technological prog-

ress are so committed to encouraging demand that they will even dismiss well-established scientific truths. For example, when plans were being made in Stockholm for the 1974 World Population Conference in Bucharest, "as each new perpetual-motion-machine solution was propounded," to furnish the world with unlimited supplies of energy, one of the scientists would simply point out that it violated the second law of thermodynamics. Finally, in frustration, one of the economists blurted out, "Who knows what the second law of thermodynamics will be like in a hundred years?"²³

During early development each human being is at first a bit of a fox (in Isaiah Berlin's terms), taking in a great grab bag of little facts. "Making sense of the world" requires that we metamorphose later into something of a hedgehog as we grope for the large ideas that will free us from memorizing so many little ones. This change is especially desirable in ecology, which can so easily become an unmanageable mass of little facts. Sanity in the face of complexity requires that we find the simple, basic fall-back positions that make sense of the world. How thinkers have managed to do this needs now to be explained.